# Evaluation of an Online Based Tetfund Interventions Management System in Nuhu Bamalli Polytechnic, Zaria

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**Abstract**
*Keeping records play a significant role in an organization as it gives history of the activities carried out and the time it happened. Therefore, in this study we developed a computer-based system using PHP, HTML, JavaScript and CSS while the database is MySQL. With this new system in place; it will provide a dependable report of various beneficiaries from different TETFund interventions lines presentation where necessary and managerial planning and decision-making. Experiment was carried out and the performance of the record processing time (RPT) between the existing and the proposed were recored and compared using Statistical t-Test sample for means. The result shows that the mean of the proposed system is 1.1575 which is clearly less than the mean of the existing system which is 2.8925. Likewise, the variance of the proposed algorithm is 0.124891667 which is clearly less than the variance of the existing system which is 0.693892. And also, the Paired T-Test between the existing and proposed were tested at 95% level of significant (0.05). The t-test result showed that t-Statistics 6.981547 > 3.182446 (critical value) and P-value is 0.000 < 0.05 (alpha), thus indicating a significant and acceptable reduction in RPT between the existing and proposed. The result analysis revealed that there were 42.84% reduction in overall processing time between the new and old system.*

**Keywords:** *Online based, computer based, record processing time*

## INTRODUCTION

Today, which we call information age as many technological developments have been emerged; the biggest task that an organization should shoulder is to stay sensitive to change. Many significant factors such as continuous developments in information technologies, information exchange, increasing expectations of the society, modern managing perceptions and applications cause organizations all over the world to develop new information management systems in order to survive (Demir, 2003). Accordingly, contributions of information technologies to educational institutions have recently been among the most emphasized affairs (Webber, 2003; Flanagan and Jacopsen, 2003; Selwood, 2000; Pelgrum, 2001; Yuen *et al.*, 2003).

Information systems support not only information process but also innovations to educational institutions (Haag *et al.*, 1998). As being adaptable to changes, these systems are helpful to cope with the demands for change. Therefore, the management of information systems improve the adaptation of the educational institutions to the environment; they enable the institutions to comprehend and define inner and outer information transfer; and thereby, institutional leaders meet both the demands and expectations of its inner and outer members; and ensures that institutional activities are arranged accurately and timely (Pegler, 1992).

The business world today is deluged by a tremendous amount of paperwork that is generated and used on a daily basis

(Bogman et al., 2016). For example, during the course of a typical court case tens of thousands of documents may be produced. Storing, managing, and retrieving information in this mountain of paper is time-consuming and costly. Worse yet, documents may be mis-filed or lost in the "system". Organizations may spend thousands or even millions of naira attempting to organize this paper in a logical way, yet still find themselves unable to find important documents when necessary.

Even if a database of documents is well organized, it may be difficult to access years later. For example, once a lawsuit has concluded, documents are typically boxed and stored in a long-term storage facility (Cowan, 2014). Such a process makes it exceedingly difficult to use the stored documents in a later case, even if they are well-organized and indexed. Consequently, the knowledge that once resided in the collection of documents may effectively be lost and never recovered.

Almost, all the staff in Nuhu Bamalli polytechnic and even the institution itself are benefitting from TETFund either directly or indirectly. Some staff are sent to abroad to further their studies and some are being fund by TETFund to attend conferences, seminars and workshops among other benefits. The documents of all these staff are being stored in a filing system in Nuhu Bamalli polytechnic Zaria which we all know that is associated to so many problems as seen above. This is one of the rationales behind this research proposal.

Tertiary Education Trust Fund (TETFund) was established as an intervention agency under the TETFund ACT - Tertiary Education Trust Fund (Establishment, etc.) Act, 2011; charged with the responsibility for managing, disbursing and monitoring the education tax to public tertiary institutions in Nigeria. Specifically, TETFund's cardinal objective is to provide the badly needed funds to support tertiary education, provide scholarship and grants for staff to enhance the productivity and quality of higher education. TETFund interventions are anchored on the following areas: Normal Intervention; Library Intervention; Research grant; Academic Staff Training & Development; Publication of Journal; Manuscript Development; and Conference Attendance.

The result of this research will lead to so many benefits to the divisions handling TETFund intervention in the institution. It will eliminate the issue of data redundancy, will lead to data consistency and integrity, data security, authorized and easy access to data, easy data recovery and data flexibility.

The reasons for using database management systems can also be stated as increasing effectiveness at work by processing information, increasing leadership effectiveness by meeting the need for information and gaining superiority in competitions by directing strategies (Yuen *et al*., 2003). Information management systems in this case aim to provide support for the administrative and educational activities of the educational leaders by processing information.

## BACKGROUND OF THE STUDY

Existing system

TETFund interventions in Nuhu Bamalli polytechnic Zaria are being managed and being coordinated by Academic Planning Division of the institution. It is division that keeps all records pertaining to TETFund intervention, checks the eligibility of each applicant based on the criteria given by TETFund and so much more tasks. These tasks are much and convoluted to handle thereby consuming a lot of working hours of the staff in the division. There are also some difficulties that both the staff of the division and other staff of the institution are facing while

engaging themselves in managing staff applications for TETFund intervention and applying for TETFund intervention respectively.

Manual System

The manual system of record keeping is the traditional system of keeping records (Erima, 2012). Separate files are kept in physical folders for each TETFund intervention have been provided to address some existing issues, but still accessing the files can only be done during the working hours and in the institution. Updating staff records means searching for all the staff files in a particular file holder.

Some of the difficulties are most of the staff have little knowledge on TETFund requirement for applying a particular intervention. So many staff are moving up and down to Academic Planning Division seeking for one information or another concerning TETFund interventions. Some records are being lost in the division, which is normal to every organization that is using filing system. Searching for record is also a difficult task (Li, 2011), almost all the files have to be accessed before a single file can be found. Generating even a simple report requires computer operator to open all the files that are involved and start typing the details required.

Computerized System

Those manual file record have been converted to electronic records. All the records are converted into Microsoft Excel file. The conversion took another long period of time to be completed.

TETFund intervention management system also integrates all essential document management, collaboration and an advanced search functionality into one easy to use solution. The system also includes administration tools to define the roles of various users, access control, user quota, level of document security, detailed logs of activity and automation setup.

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Proposed system

The proposed system will address all the issue listed above. It will provide an interface for the staff to apply for any intervention they are eligible to apply. Then the user responsible of accessing application will instantly have a notification on his/her account on the system indicating the number of pending applications. Moreover, all the reports that are required by the division can be generated from the system easily and accurately

The proposed system comprises of both records keeping system and document management system. The system will be responsible of managing all the records (that is the details and the documents) required for applying TETFund intervention.

## AIM AND OBJECTIVES

The aim of this research is to determine the performance between existing spreadsheet application with the new web based (database driven) application used for TETFund interventions.

This will be achieved under the following objectives;

i. Investigate the performance of the manual system

ii. Design and test run an automated system.

ii. Determine the most optimal system between the manual and the automated system.

## LITERATURE REVIEW

The governments of most industrialized nations in the world are investing heavily in research programs to address the issues of conventional paper records, but yet

there is no comprehensive technical solution (Basu, 2004). However, a fundamental strategy is emerging that involves refreshing the storage media, migrating the data onto a new hardware and software; and all necessary steps to validate their integrity, authenticity and addressing issues that has to do with the context of the data which preserve the meaning of the data. The objective is to retain the ability to display, retrieve, manipulate and use digital information in the face of constantly changing technology. These strategies require the development of highly specialized techniques which are also often relative expensive. The management of these electronic records is a relatively new issue for developing countries, but the governments are already beginning to address these challenges.

The existing literature on Human Resources and Information System (HRIS) suggests that they have different impacts on HR across organizations; but provides little explanation for this variation. Early surveys suggested that HRIS were used predominantly to automate routine tasks and "to replace filing cabinets" (Martinsons, 1994). Ball (2001) submitted that HR had missed the strategic opportunity provided by HRIS. More recent research shows greater use of HRIS in support of strategic decision-making by HR (Hussain *et al*., 2007). However, the extent to which HRIS is used in a strategic fashion differs across organizations, with the vast majority of organizations continuing to use HRIS simply to replace manual processing and to reduce costs (Bee *et al*, 2002; Brown, 2002). The last decade has witnessed a significant increase in the number of organisations gathering, storing and analysing human resources data using Human Resource Information Systems (HRIS) (Dery, 2006; Ball, 2001; Barron *et al*, 2004; Hussain *et al*, 2007; Ngai *et al*, 2006). In this paper we showed that the study of the impact of HRIS is of direct significance to the ongoing debate about the extent to which Human Resources (HR) can play a strategic role in the organization (Dery, 2006; Beckers *et al*, 2001; Hewitt Associates, 2007; Lawler *et al*, 2003; Sheehan *et al*, 2006). Specifically, we examine the argument that through its capacity to deliver accurate and timely metrics, HRIS has the potential to assist the HR function in developing business strategy and thus enhancing organizational performance (Barney *et al*, 1998; Broderick *et al*, 1992; Gueutal, 2003; Lawler *et al*, 2004; Lengnick-Hall *et al*, 2003).

Albert *et al* (1977) conducted their study when human resources information system (HRIS) was a new concept and just came into the market. They portrayed HRIS as a system useful in planning and accountability of human resources and as a staff management tool too. The authors also specified various modules, advantages and uses of HRIS at that time and future expectations from HRIS in human resource management. Kirstie (2001) explained the dearth of research in Human Resources Information Systems (HRIS) in her work by quoting that the gigantic information system related literature including its implementation, use and impact clarifies that it is a healthy researched area but its implementation with human resource is a scarce. Initially staff systems were developed to stockpile the records and reports allied with staff administration, but with time call for efficacy increases and thus computer-based HRIS is developed (Khera *et al*, 2012; Martinsons, 1997).

Beckers *et al* (2002) avowed that the main obstruction in the implementation of a HRIS is the sky-scraping cost of setting up and maintaining a HRIS which is in line with Kovach *et al* (1999) affirmed that a lack of funds and support of top management are the stumbling blocks in achieving the full potential of HRIS. Due

to this obstacle, in order to embrace HRIS operations, it is necessary to make certain that bankers or organizations are agreeable to give their support for setting up a HRIS (Ngai *et al*, 2006). Apart from these difficulties HRIS has various advantages and the most crucial is the employee retention as employees themselves are crucial for the organization; this is also supported by Beulen (2009) as he contended that an HRIS blunt the edge of staff attrition by providing HR officers with the information they need.

The current generation of HRIS automate and transfer routine administrative and compliance functions traditionally performed by corporate HR departments and can facilitate the outsourcing of HR (Barron *et al*., 2004). In doing so, HRIS does not only make it possible for organizations to significantly reduce the costs associated with HR delivery, but also to reassess the need for retaining internal HR capabilities. However, HRIS also provide HR professionals with opportunities to enhance their contribution to the strategic direction of the firm. Firstly, by automating and devolving many routine HR tasks to line management, HRIS provide HR professionals with the time needed to direct their attention towards more business critical and strategic level tasks, such as leadership development and talent management (Lawler *et al*., 2003). Second HRIS provides an opportunity for HR to play a more strategic role, through their ability to generate metrics which can be used to support strategic decision making (Hendrickson, 2003; Lawler *et al*., 2004; Lengnick-Hall *et al*., 2003).

## METHODOLOGY

System Design

The purpose of this phase is to transform the identified requirement statements into system design specification for construction. At this stage the researcher would be able to construct the initial prototype of interface and database, although this would only be used to discuss the logical flow of operations. The following subject matters are very crucial for discussion under system design. These types of goals are usually derived from the non-functional requirements of the system such as security and user validation.

System Architecture

The architecture used for this system is a 3-tier Client/Server architecture where the staff or user can use internet browsers to access the online report provided by the system within the local area network (LAN) of the organization or anywhere using the internet. The data tier maintains the applications data such as staff data, progress report, and fund released by TETFund etc., and stores these data in a relational database management system (RDBMS). A relational database is the most popular database management system (DBMS) in use today by computers. It stores data in a series of two-dimensional tables called relation, which is in tabular form. The middle tier (Web/Application Server) implements the business logic, controller logic and presentation logic to control the interactions between the applications clients and data. The business logic dictates how clients would be able or not to access the application data and how applications would process data. The controller logic processes client requests include request to view staff records, to record grant benefitted so far or to retrieve information from the database.

Moreover, the web server in architecture is a program that runs on a network server (Computer) to respond to hypertext transfer protocol (HTTP) requests. The commonly used web servers are Internet Information Server (IIS) and Apache. The web server used in this system is IIS. HTTP is a standard protocol for transferring data across the internet and intranet. On the other, the client tier is the

application user interface that contains data entry forms and clients side applications. It displays data to the user and it is the interface where the user interacts directly with the application. Also, the client tier interacts with Web/ Application Server to make requests and to retrieve data from the database and then displays the retrieved data from the server to the user.

Hardware/Software Platform

One of the main tasks in system design is the software and hardware platform required for the application. This system is a client-server application with a system unit in the General Manager Administration office which will be the client. MySQL was used to develop the database for greater and reliable security purposes. This can easily be downloaded from the Internet; consequently, there is no need for licensing fee. On the other hand, Microsoft Windows (such as Windows 8 and Windows 10) and Windows 2000 server serves as the operating system. For the hardware requirements, a hard disk with a capacity of 40GB for holding all the files that would be stored; another 40GB mobile hard disk drive is needed as backup. Other hardware requirements are the monitor, keyboard, mouse, printer, Internet access, Pentium 4 GHZ processor and Uninterrupted Power Supply (UPS). All these defined the hardware and software requirements needed to complete the proposed system

Database Design

The design of database system is far from being a trivial operation as much analysis of the particular application is necessary to determine the data that are required and how they would be linked together. Once this is done, an appropriate database model can then be chosen. In order to store information consistently, the researcher map objects into tables and the attributes into fields to the specific table based on the objects found in the system. Therefore, major tables that will be implemented on the selected database management system (DBMS) would be identified. The DBMS ties together the logically related data in one or more files by using hierarchical structure or relational structure.

The design under consideration has one-to-many and many-to-many relationships. The staff and staff records tables have many-to many relationships. And one of the aims of database system is to reduce redundancy for this reason, many-to-many relationships has to be reduced to one-to-one relationship. The table relationship generated in this database is shown in figure1.

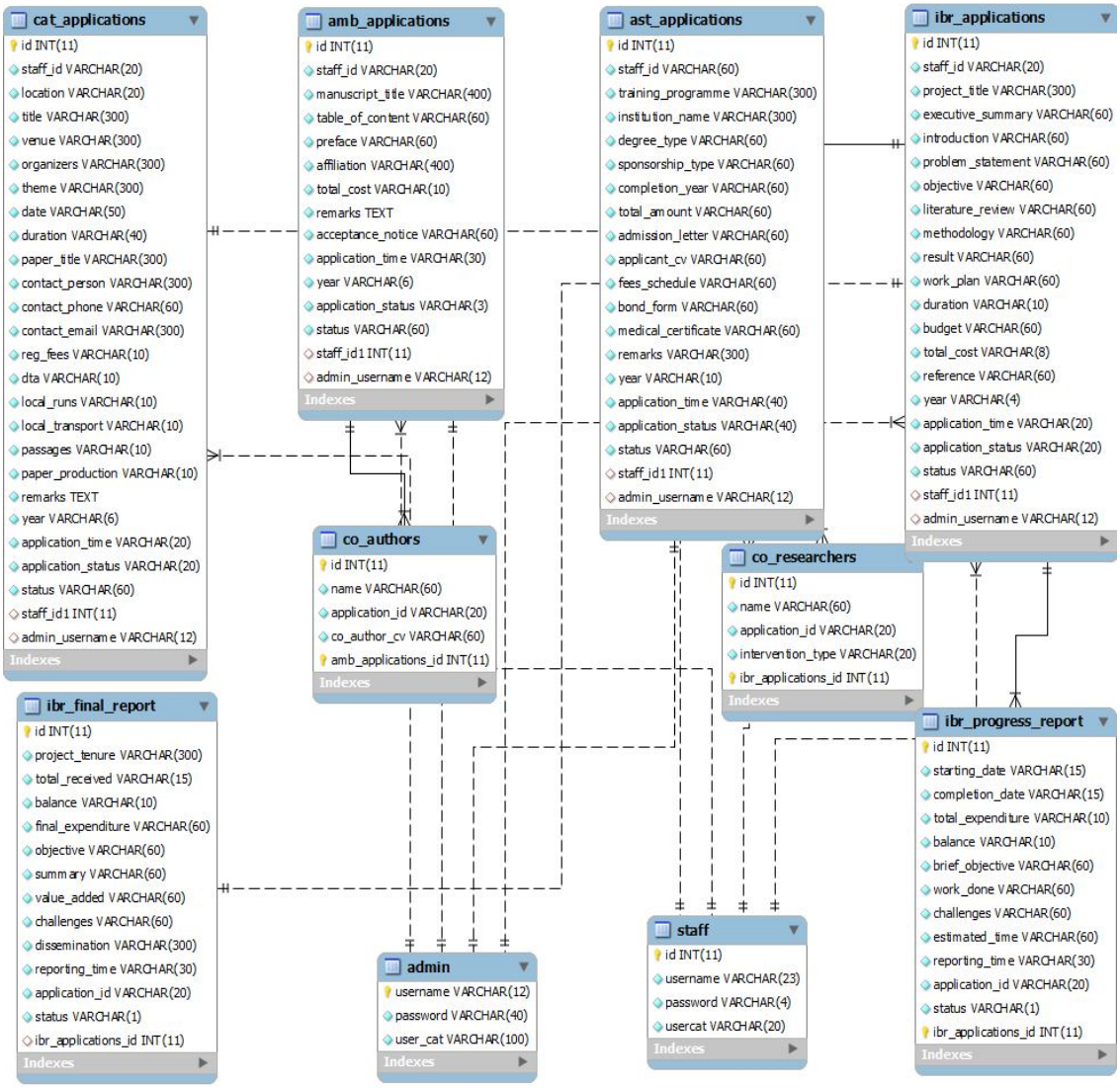


Figure 1: Overall database structure

Coding

The system coding is done by using PHP, CSS, MySQL, JavaScript and HTML. At this stage, the program specifications of the detailed design are converted into PHP, CSS, MySQL, JavaScript and HTML instructions. The programs that are generated from these languages coordinate the data movements and control the entire process in the TETFund Intervention Management System.

**RESULTS**

Expected output

The result are the findings of most of the research objectives. These include the following.

a. To develop an online based TETFund interventions management system for Nuhu Bamalli polytechnic.
b. Facilitate the input of data; the system will guide user in the correct order of entering data and by simply clicking the tab allows you to go to the next field.
c. The system would automatically report on TETFund related information such as number of IBR beneficiaries in a particular year.
d. Construction of an efficient database management system using MySQL

e. To compare the existing (spreadsheet) with the new proposed (web based and database)
f. To evaluate the performance of the existing spreadsheet and the proposed web-based application

Data source

Data source for this research are the previous records of 2015 tetfund interventions collected from Nuhu Bamalli Polytechnic Academic Planning Division of the institution. The data are divided into five parts. Part one, consists list of records of Institution based Research (IBR) – Research, part two consists of list of records of publication of Academic/Research Journals (PA), part three consisted list of records lists of records of Academic manuscripts into books Publication – Books (MP), part four consists list of records of Academic Staff. Training and Development study – (ASTD), part five consists list records of Conference Attendance- (CA) and part six consisted of list of records of Equipment Fabrication. Table 5.1 below show NBPZ's summary for 2015 TETFund intervention records.

**Table 1:** Summary for 2015 TETFund intervention records for NBPZ (Source: APD nubapoly)

| SN | INTERVENTION TYPE | ABBREVIATION | NUMBER OF RECORDS |
|---|---|---|---|
| 1 | Institutional Based Research | IBR | 15 |
| 2 | Conference Attendance | CA | 229 |
| 3 | Academic Staff Training and Development | ASTD | 22 |
| 4 | Academic Manuscript and Books | AMB | 20 |
| 5 | Equipment Fabrication | EF | 2 |

Sample Data Selection

The sample data selected used in this research where records list of different TETFund intervention of only one year (2015) were selected from many years for the purpose of this research. The primary data were stored in spreadsheet format which can be opened and manipulated in a Microsoft excel software and like. Total of forty (40) sample of records selected, ten (10) from each type of the interventions. Table 5.2 below show some sample number of sample intervention records per intervention used for the research.

**Table 2:** Selected sample data (Source: APD nubapoly)

| SN | INTERVENTION TYPE | ABBREVIATION | NUMBER OF RECORDS |
|---|---|---|---|
| 1 | Institutional Based Research | IBR | 10 |
| 2 | Conference Attendance | CA | 10 |
| 3 | Academic Staff Training and Development | ASTD | 10 |
| 4 | Academic Manuscript and Books | AMB | 10 |

Statistical method

Simple statistical technique was used to tabulate the results of this study. The primary data were analyzed using a percent of number of record process within specified period of time to evaluate performance between the old and the new proposed system. To compute the percent of the new and old method, the number of records to each different part of the data was divided by the total number of the records used. The percent of the new and old system determines the work performance that will be reported. The test is a statistical method used to tell how significant the differences between groups are: In other words, it lets us to know if those differences (measured in means/averages) could have happened by chance. In research, comparisons of results from experimental groups are often encountered. The two-sample t-test (also called independent samples t-test) and the paired Two Sample for means are probably the most widely used to tests in statistics for the comparison of mean values between two samples.

The t-Test Paired Two Sample for Means is a way to tell if the difference between before and after results is significant or if those results could have happened by chance.

**FINDINGS**

Performance of records processing time of new and old system

Four categories of TETFund interventions from the sample data were considered for the experiment to measure processing time of the new web based/database application and the old spreadsheet application using Microsoft Excel. The processing time taken (in hours) for each sample of record of each TETFund interventions were measured and recorded between the new propose system and the old system, and finally obtained the following result, as shownin the table 3.

Table 3: Result of record performance time between the old new and the old system

| SN | ABBREVIATION | OLD SYSTEM | NEW SYSTEM | DIFFERENCE |
|---|---|---|---|---|
| 1 | IBR | 2.61 | 1.15 | 1.46 |
| 2 | CA | 4.13 | 1.65 | 2.48 |
| 3 | ASTD | 2.33 | 0.83 | 1.50 |
| 4 | AMB | 2.50 | 1.00 | 1.50 |

The result obtained from the experiment indicated that the processing time of the old system versus the new system maintained their level of task; by processing time. This means that the highest and lowest in the old system still are highest and the lowest in the new system. And also, all the hierarchy are maintained in the new system. The CA were the highest, followed by IBR, followed by ABB and ASTD as the least.

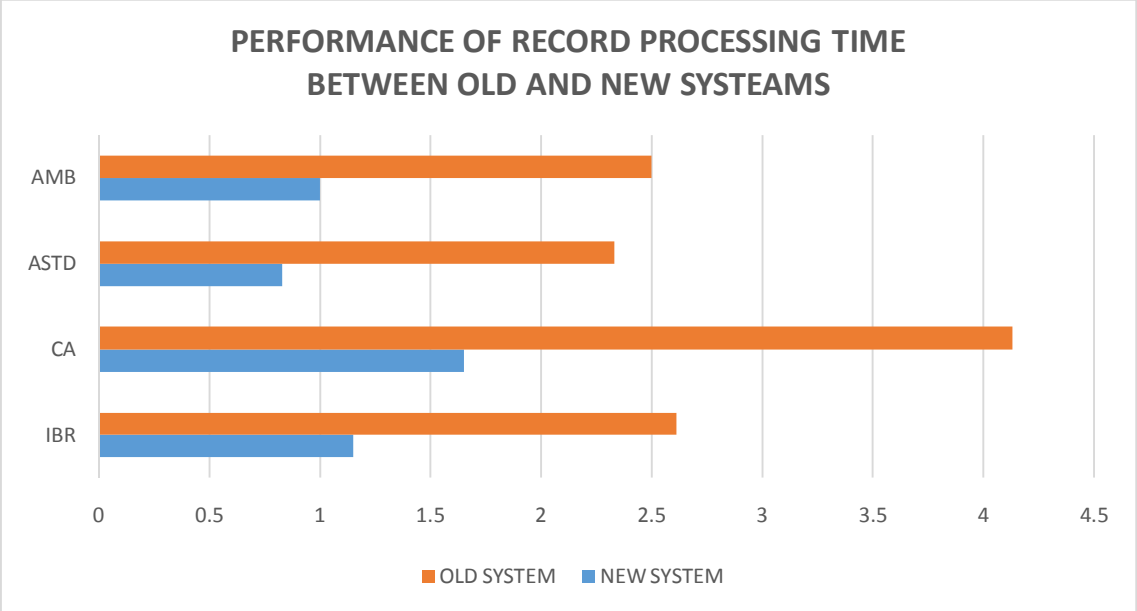


Figure 2: Performance of records processing time of new and old system

Performance of records processing time between different interventions

The performance of records processing time between different interventions were obtained from the difference between the new and the old system processing time. Given a list of interventions performance was clearly shown, the faster between them and decreased shows the slower in their work performance. Only the four interventions were considered for the experiment. The following Table 5.2 shows the performance of processing time of between different interventions.

The result indicates that the differences obtained processing time of the new and the old system is the performance of record processing time among the interventions. All the four interventions were represented in the results, as shown in Figure 1. The breakdown consisted of 21% processing time decrease for IBR, 36% decrease for CA. 21% for ASTD, and 22% drop for AMB.

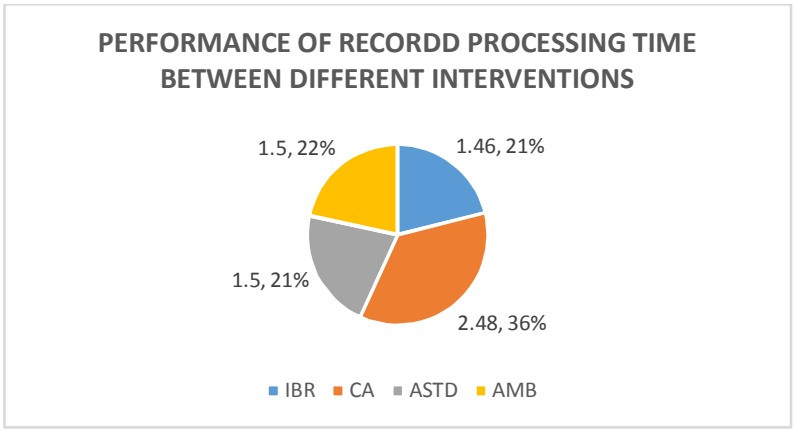


Figure 3: Performance of records processing time between different interventions

Table 4:Minitab statistical analysis: t-Test: Paired Two Sample for Means

| | *Old* | *New* |
|---|---|---|
| Mean | 2.8925 | 1.1575 |
| Variance | 0.693892 | 0.124891667 |
| Observations | 4 | 4 |
| Pearson Correlation | 0.971099 | |
| Hypothesized Mean Difference | 0 | |
| df | 3 | |
| t Stat | 6.981547 | |
| P(T<=t) one-tail | 0.003016 | |
| t Critical one-tail | 2.353363 | |
| P(T<=t) two-tail | 0.006032 | |
| t Critical two-tail | 3.182446 | |

Result Analysis

Performance of records processing time between both previous and new proposed application ware measured and compared using t- Test: Paired Two Sample for Means to test if the null hypotheses (means of two populations are equal) is significance to be accepted or rejected

The paired T-Test between the previous spreadsheet application and the new web-based system was tested at 95% that is the probability 0.05, the test result shows that t Stat 6.981 > 3.182 of t Critical and P-value is 0.000 < 0.05 (alpha) that is there is significant acceptable change between the two-result obtained. Table 4 shows the statistical analysis.

**DISCUSSION**

The result shows that the mean of the proposed system is 1.1575 which is clearly less than the mean of the existing system which is 2.8925. Likewise, the variance of the proposed algorithm is 0.124891667 which is clearly less than the variance of the existing system which is 0.693892. And also, the Paired T-Test between the existing and proposed were tested at 95% level of significant (0.05). The t-test result showed that t-Statistics 6.981547 > 3.182446 (critical value) and P-value is 0.000 < 0.05 (alpha), thus indicating a significant and acceptable reduction in RPT between the existing and proposed. The result analysis revealed that there were 42.84% reduction in overall processing time between the new and old system

**CONCLUSION**

From the result outcome, the new proposed web-based database application was clearly shown that is faster than the spreadsheet application.

The result also shows that performance of records processing time between different interventions, where IBR has less time consuming. ASTD and AMB has the same processing time and CA was the highest.

**RECOMMENDATIONS**

There is need to put more focus on CA and find out more ways to reduce it record processing time since it has the highest number of record and record processing time among the interventions.

Adapting more new web technology may help in improving the performance of records processing time, such technologies are:

I. Jquery
II. Node.j

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